



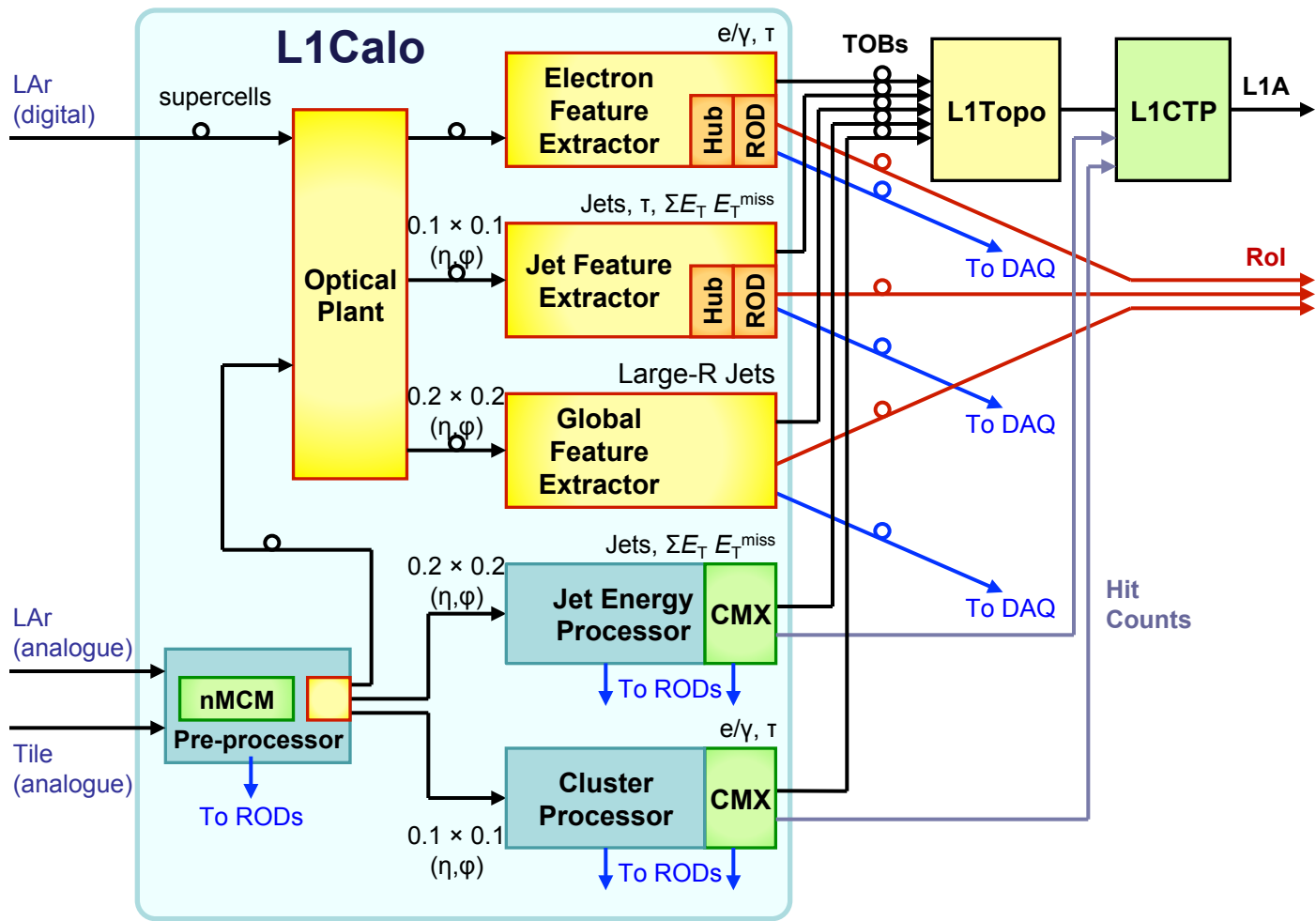
Level-0 Calorimeter

WBS 6.8.1.1

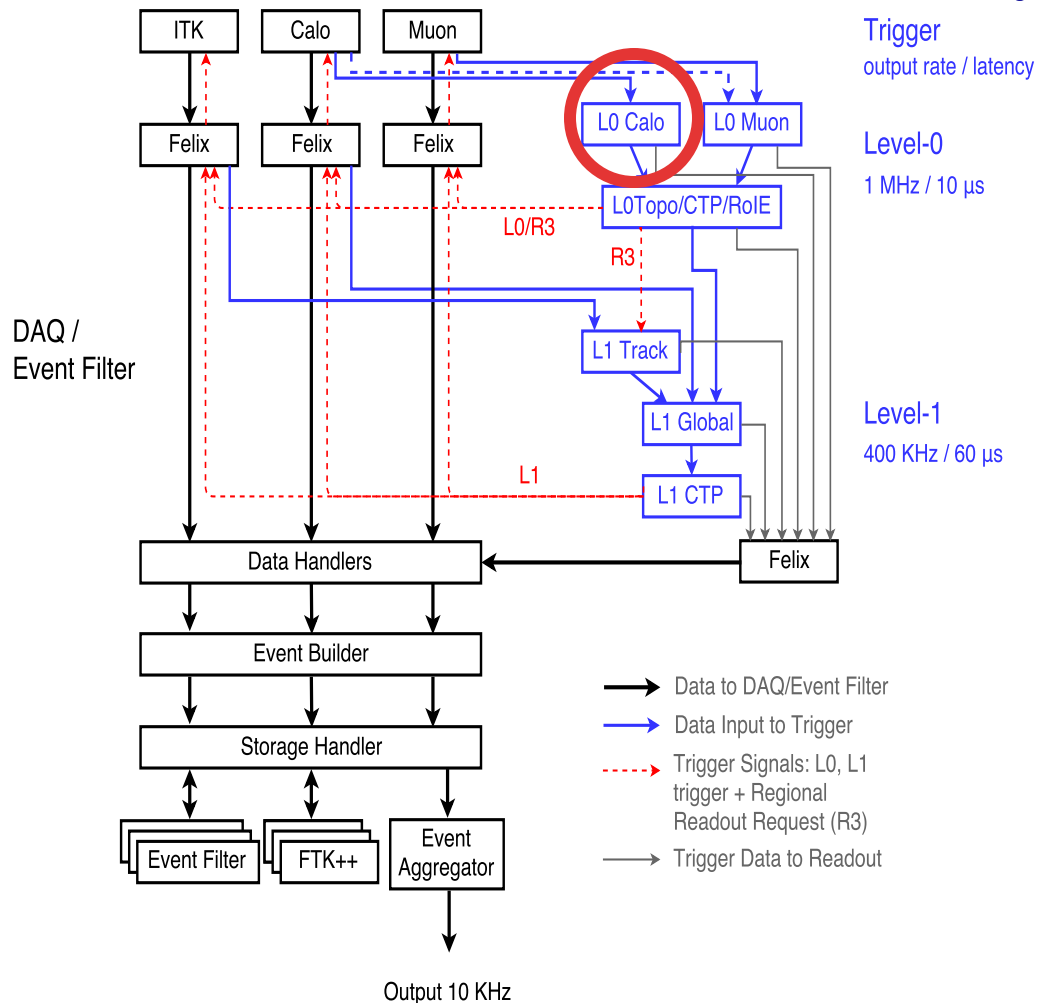
Wade Fisher

Michigan State University

Phase 1 Upgrade Overview



HL-LHC System Upgrade Plans



- **Level-0 Calorimeter Trigger**
 - Phase-1 L1 system becomes HL-LHC L0 system
 - Tile input to L0Calo will be new digital input from Tile preprocessor
 - New Tile Optical Plant needed for new Tile front-end electronics mapping / interface
 - Builds on existing optical plant experience and design.



Cost Tables: L0Calo

- L0Calo Optical Plant costing developed via direct analogy to the ongoing Phase-1 optical plant project

6.8.x.1 L0Calo						
WBS	Description	Labor FTE	Labor Ayk\$	M&S Ayk\$	Travel Ayk\$	TOTAL Ayk\$
6.8.x.1	L0Calo	0.75	119	49	19	187
	Engineers	0.75				
	Techs	-				
	Students	-				
		-				

Task Name	Effort (person-months)	Calendar Duration (months)
Engineering Specification	1	6
Design	2	6
Assembly	1	9
Acceptance Tests	2	9
System Tests	2	6
Project Review Preparation	1	12
Project Total:	9 (0.75 FTE)	36 (total duration)

Item	Cost per item	# of items	Total cost
MTP cable	\$150	120	\$18,000
MTP breakout cable	\$100	12	\$1,200
Mapping module	\$5,500	5	\$27,500
Enclosure	\$1000	1	\$1,000
Misc parts			\$1,300
Total			\$49,000



Cost Tables: WBS 6.8 Trigger

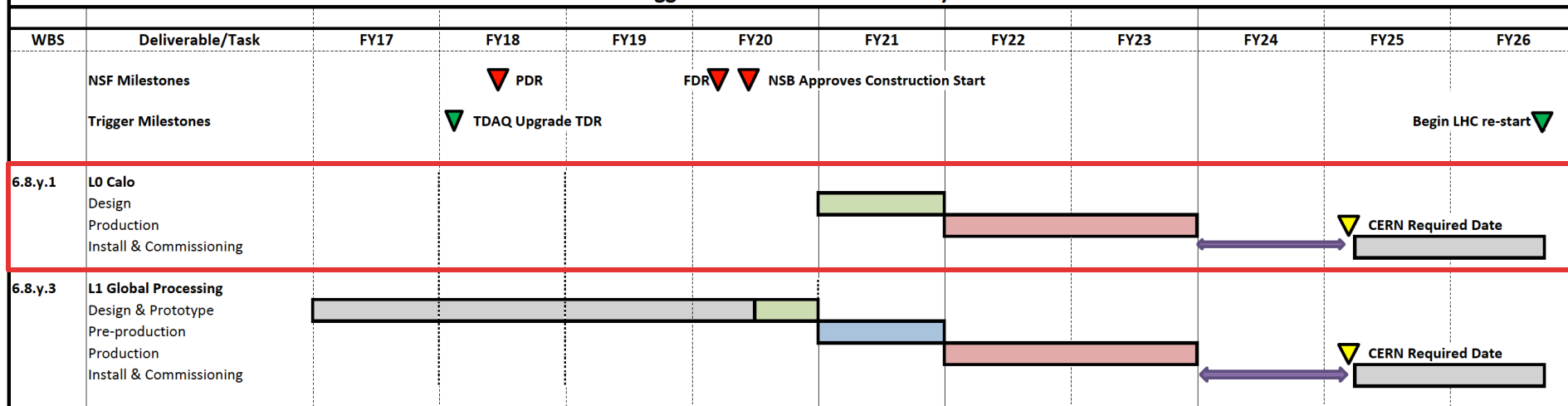
6.8 Trigger NSF FTEs						
Item/Phase	FY20	FY21	FY22	FY23	FY24	Grand Total
6.8.y.1 L0 Calo	-	0.25	0.42	0.08	-	0.75
Design	-	0.25	-	-	-	0.25
Prototype	-	-	-	-	-	-
Pre-production	-	-	-	-	-	-
Production	-	-	0.42	0.08	-	0.50
6.8.y.3 L1 Global Processing	1.25	2.50	2.50	2.50	-	8.75
Design	-	-	-	-	-	-
Prototype	1.25	-	-	-	-	1.25
Pre-production	-	2.50	-	-	-	2.50
Production	-	-	2.50	2.50	-	5.00
NSF Grand Total	1.25	2.75	2.92	2.58	-	9.50

6.8 Trigger NSF Total Cost (AYk\$)						
Item/Phase	FY20	FY21	FY22	FY23	FY24	Total
6.8.y.1 L0 Calo	0	43	126	19	0	187
Design	0	43	0	0	0	43
Prototype	0	0	0	0	0	0
Pre-production	0	0	0	0	0	0
Production	0	0	126	19	0	144
6.8.y.3 L1 Global Processing	337	611	569	586	0	2,103
Design	0	0	0	0	0	0
Prototype	337	0	0	0	0	337
Pre-production	0	611	0	0	0	611
Production	0	0	569	586	0	1,155
NSF Grand Total	337	653	695	605	0	2,290



Schedule

U.S. ATLAS HL-LHC Upgrade Project WBS 6.8 Trigger NSF Deliverable Summary Schedule





Schedule

- Milestones & External Dependencies
 - L0Calo schedule pushed back to match finalization of TileCal specifications
 - We don't truly know this date, so the project is divided into two TileCal readiness periods: preliminary and final versions of the mapping requirements.
 - Can link the final TileCal mapping requirements to the Tile Preprocessor FDR (PRR?)
 - In principle we should have the PDR/FDR/PRR for upgrade projects
 - The current FOX project only has PDR/PRR scheduled
 - The P2 upgrade project is just replacing the TileFOX component with the same technology, so do we need these reviews?



List of Tasks

	Level 3 WBS #	6.8.1					
	Level 4 WBS #	6.8.1.1 L0Calo Fiberplant					
	Institution:	Michigan State University					
	Prepared by:	Wade Fisher					
	L5 WBS if need	Task name	Start Date	Finish Date	Duration	Material	Travel
	(L5 WBS is NOT mandatory)		(mm/dd/yyyy)	(mm/dd/yyyy)	(work days)	Enter "Yes" or "No"	Enter "Yes" or "No"
Milestone		Milestone: Preliminary TileCal optical mapping requirements available		9/30/2020			
Engineering Specification		Preliminary optical mapping scheme	10/1/2020	11/30/2020	43	no	no
Engineering Specification		Evaluation of passive optical splitting requirements	12/1/2020	1/30/2021	44	no	no
Engineering Specification		Revised optical mapping scheme	2/1/2021	3/30/2021	42	no	no
Milestone		Milestone: TileCal optical mapping requirements finalized		7/1/2021			
Engineering Specification		Final optical mapping scheme	7/2/2021	8/30/2021	42	no	no
Engineering Specification		L0Calo preliminary design review of optical plant fiber mapping	9/1/2021	9/29/2021	21	no	yes
Milestone		Milestone: L0Calo PDR of optical plant fiber mapping complete		9/30/2021			
Optical Plant Design							
Design		Design of input optical mapping components	10/1/2021	11/30/2021	43	no	no
Design		Design of optical modules	12/1/2021	1/30/2022	43	no	no
Design		L0Calo FDR/PRR of optical plant fiber mapping	2/1/2022	2/28/2022	20	no	yes
Milestone		Milestone: L0Calo FDR/PRR of optical plant fiber mapping complete		3/1/2022			
Production of Optical Plant							
Procurement		Procurement of optical mapping components and housing	3/2/2022	4/30/2022	43	yes	no
Assembly		TileCal Optical plant assembly	5/1/2022	6/30/2022	44	no	no
Acceptance Tests		Input light level tests	7/1/2022	8/15/2022	32	no	no
Acceptance Tests		Output light level tests	8/16/2022	9/30/2022	34	no	no
Integration Tests							
System Tests		Optical plant component tests & integration	10/1/2022	11/15/2022	32	no	yes
System Tests		Optical plant integration	11/16/2022	12/30/2022	33	no	yes
Milestone		Milestone: Optical plant ready for installation		1/1/2023			

FY20

FY21

FY22



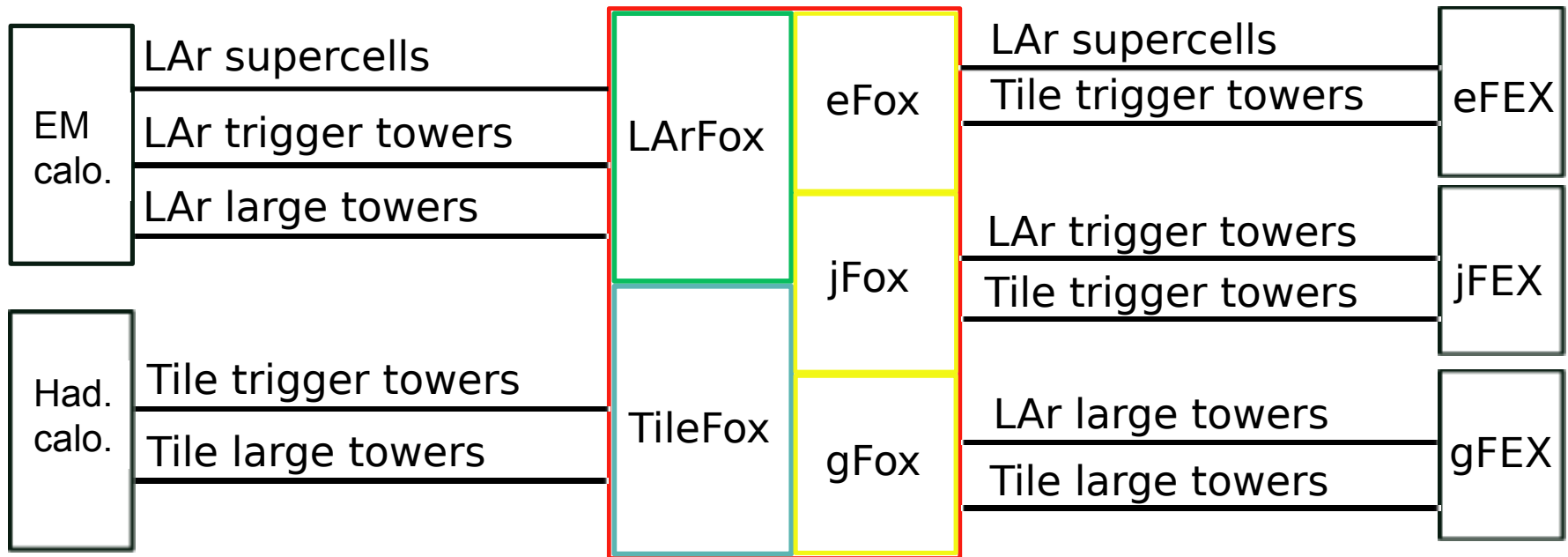
Backup Slides



FOX – Fiberplant

- Phase 1 Deliverable: Fiber-Optic eXchange (FOX)

- Project underway at MSU
 - Well-understood technical challenges
- optical plant





Version-1 Optical Fiber Plant

